

RED ALGAL PARASITES OCCURRING ON MEMBERS OF THE GELIDIALES

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Three genera and four species of red algae have been reported as parasitic on the various members of the Gelidiales. They are *Syringocolax macroblepharis* Reinsch (1875; Martin and Pocock, 1953), *Gelidiocolax microsphaerica* Gardner (1927), *Choreocolax suhriae* Martin et Pocock (1953), and *C. margaritoides* Martin et Pocock (1953). These species are reviewed and two parasitic red algae occurring on *Pterocladia*, also a member of the Gelidiales, collected by Setchell in New Zealand in 1904 and by Papenfuss in New Zealand in 1949 and in Hawaii in 1942, are described as new.

Gelidiocolax microsphaerica was obtained in 1911 by Gardner on *Gelidium pulchrum* growing at Balboa Beach, Orange County, California. Dangeard in 1952 reported *Gelidiocolax microsphaerica* (in error as *G. hemisphaerica*) from Dakar. Subsequently, the species was reported by Dawson (1952, 1953) from the shores of Isla San Martín, Baja California. Careful examination of specimens of *Gelidium pulchrum* (collected at Punta Descanso, Baja California, Mexico, Dawson 131-45, April 8, 1945, UC 694021) has resulted in the finding of additional specimens of *Gelidiocolax microsphaerica*. The tubercle produced by this species is spherical in form, about 175-225 μ . in diameter, and difficult to detect without the aid of a handlens; it is mostly composed of the reproductive tissue of the parasite. The carpogonial branch is composed of two cells, the spermatangia are produced in chains, and the tetrasporangium is cruciately divided. Although currently placed in the Gelidiaceae (cf. J. & G. Feldman 1958), it appears more likely that *Gelidiocolax* belongs in the Choreocolacaceae.

Choreocolax suhriae is parasitic on *Suhria vittata* in South Africa; the wart-like swelling is composed of a dense mixture of parasite and host tissues; it is about 2-3 mm. broad and about 1 mm. high when mature. During maturation, many or sometimes most of the surface cells of the parasite produce reproductive organs. Its carpogonial branch is two-celled like that of *Gelidiocolax microsphaerica* and not four-celled as in *Choreocolax polysiphoniae*, which is the type species of *Choreocolax* (Sturch 1926). In fact *C. suhriae* resembles *G. microsphaerica* so much that it should be placed in *Gelidiocolax* instead of in *Choreocolax*. The following combination is therefore proposed: **Gelidiocolax suhriae** (Martin et Pocock) Fan et Papenfuss, comb. nov. (*Choreocolax suhriae* Martin et Pocock 1953, p. 48).

Choreocolax margaritoides is parasitic on *Beckerella pinnatifida* in

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South Africa. Tetrasporic specimens of this species were examined. The pustule is roundish, 200–290 μ in diameter, and is mostly composed of parasite tissue. This species is closely related to *Gelidiocolax microsphaerica*. However, the tetrasporic pustule is slightly larger than that of *G. microsphaerica*, which is 175–225 μ in diameter. The tetraspores of *C. margaritoides* are 12–18 μ in length; those of *G. microsphaerica* are 22–28 μ in length. In our opinion *C. margaritoides* is a species of *Gelidiocolax*. The following combination is therefore proposed: ***Gelidiocolax margaritoides*** (Martin et Pocock) Fan et Papenfuss, comb. nov. (*Choreocolax margaritoides* Martin et Pocock 1953, p. 50).

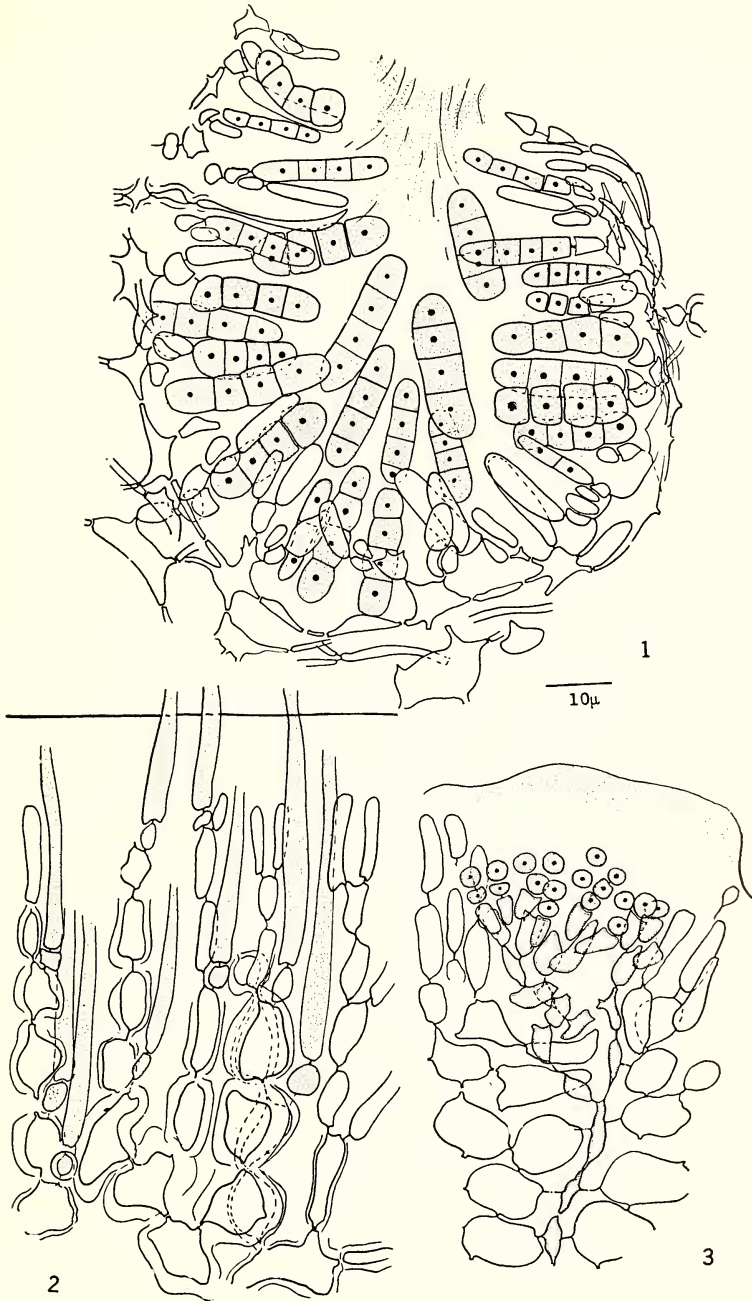
Gelidiocolax mammillata Fan et Papenfuss sp. nov. Planta in *Pterocladia* sp. parasitica, constans e filamentis multis irregulariter ramosis, in telam hospitis profunde penetrantibus, tuberculum solidum verruciforme efficientibus; tuberculum maturum 0.3–1 mm. lat., 0.3–0.5 mm. alt., e tela et hospitis et parasitici compositum, projectiones mammillatas multas in superficie habens: cystocarpi, spermatangia, tetrasporangiaque in projectionibus mammillatis praecipue producta, et in cubiculis per telas hospitis effectis reperta; ramus carpogonialis bicellularis; spermatangia in catenis formata, per septa transversa ab extremitatibus terminalibus cellularum-matrum spermatangialium successive abscissa; tetrasporangia cruciate divisa.

Plant parasitic on *Pterocladia* sp., consisting of many irregularly branched filaments which penetrate deeply into the host tissue, producing a wart-like solid tubercle; tubercle when mature 0.3–1 mm. wide and 0.3–0.5 mm. high, composed of both host and parasite tissues, with many mammillate projections on the surface; cystocarps, spermatangia and tetrasporangia produced primarily in the mammillate projections and occurring in chambers produced by host tissue; carpogonial branch two-celled; spermatangia formed in chains, successively cut off by transverse septa from the terminal ends of the spermatangial mother cells; tetrasporangia cruciately divided.

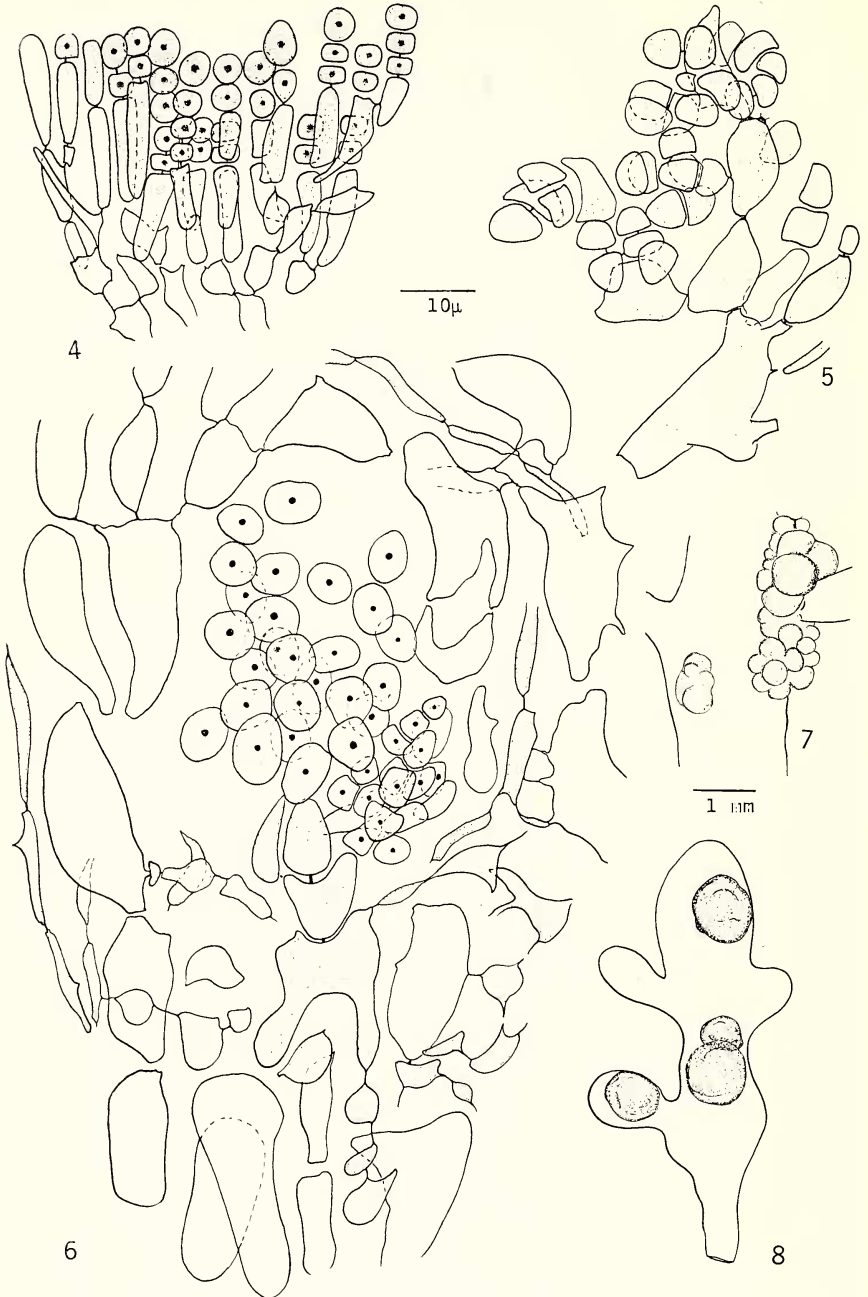
Type. Hanauma Bay, Oahu, Hawaiian Islands, March 1, 1942. *G. F. Papenfuss* (UC 1058497). Figs. 3, 6, 7, 9, 10.

Pterocladiphila hemisphaerica Fan et Papenfuss gen. et sp. nov. Planta in *Pterocladia lucida* parasitica, constans e filamentis multis irregulariter ramosis in telam hospitis profunde penetrantibus, tuberculum solidum plus minusve hemisphericum efficientibus; tuberculum maturum 0.4–1 mm. lat., 0.4–0.8 mm. alt. e telis et hospitis et parasitici compositum, in superficie inaequale; cystocarpi, spermatangia, tetrasporangiaque in concepticulis formata; ramus carpogonialis bicellularis; spermatangia in catenis producta, per septa transversa ab extremitatibus terminalibus cellularum-matrum spermatangialium successive abscissa; tetrasporangia zonate divisa, pavimento lateribusque conceptaculi introrsum obducentia.

Plant parasitic on *Pterocladia lucida*, consisting of many irregularly branched filaments which penetrate deeply into the host tissue, producing



FIGS. 1, 2. *Pterocladiphila hemisphaerica*: 1, tetrasporangia within the conceptacle; 2, carpogonial branches. FIG. 3. *Gelidiocolax mammillata* (marginal stippling) with spermatangia (solid stippling).



FIGS. 4, 5, 8. *Pterocladophila hemisphaerica*: 4, spermatangia; 5, part of gonimoblast and carposporangia; 8, habit of parasite on *Pterocladia lucida*. FIGS. 6, 7. *Gelidiocolax mammillata* (stippled cells): 6, gonimoblast with carpösporangia; 7, habit of parasite on *Pterocladia* sp.



FIGS. 9, 10. *Gelidiocolax mammillata* (marginal and solid stippling); 9, tetrasporangia; 10, carpogonial branches.

a more or less hemispherical solid tubercle; tubercle when mature 0.4–1 mm. wide and 0.4–0.8 mm. high, composed of both host and parasite tissues, uneven on surface; cystocarps, spermatangia and tetrasporangia formed in conceptacles; carpogonial branch two-celled; spermatangia produced in chains, successively cut off by transverse septa from the terminal ends of the spermatangial mother cells; tetrasporangia zonately divided, lining floor and sides of the conceptacle.

Type. Island Bay near Wellington, New Zealand, June 1904. *W. A. Setchell 6098* (UC 1141475) [separated from host plant, *Pterocladia lucida* (UC 95977)]. Figs. 1, 2, 4, 5, 8.

Additional material. New Zealand: Kaikoura, 17 February 1949, *Moore and Papenfuss* (UC 1058496); Goose Bay 10 miles south of Kaikoura, 18 February 1949, *Moore and Papenfuss* (UC 1058495).

Pterocladiphila is readily distinguished by its zonately divided tetrasporangia (fig. 1), formed within conceptacles, from all the known genera of parasitic red algae except *Chaetolithon* Foslie (1898; Kylin 1956), *Choreonema* Schmitz (1889; Suneson 1937), and *Polyporolithon* Mason (1953) in which three genera the sporangia are also zonately divided and localized in conceptacles. *Chaetolithon*, *Choreonema* and *Polyporolithon* belong to the family Corallinaceae, which family is almost exclusively composed of calcareous algae. Also, as far as known, the spermatangia are not produced in chains in the Corallinaceae as they are in *Pterocladiphila*.

Pterocladiphila cannot be assigned to the Choreocolacaceae owing to its zonately divided tetrasporangia which are formed in deeply sunken conceptacles (fig. 1). Nor can it be assigned to the Corallinaceae (although it resembles some members of this family by its simple, two-celled carpo-

gonial branch and its zonately-divided tetrasporangia produced in conceptacles) because it is not calcified as all the Corallinaceae are with the exception of *Schmitziella* (Batters 1892, Suneson 1944); it also differs from members of this family in having the spermatangia produced in chains (fig. 4). A new family *Pterocladiphilaceae* is therefore suggested here, and this family is tentatively assigned to the order Cryptonemiales. This family is characterized by the following features.

Pterocladiphilaceae Fan et Papenfuss fam. nov. Thallus haud calcifactus ramo carpogonio bicellulato spermatangia catenulata septis transversis termino cellulae maternae spermatangialis enata tetrasporangia zonatim divisa in conceptaculis circumscripta.

Thallus not calcified; carpogonial branch two-celled; spermatangia produced in chains, successively cut off by transverse septa at the terminal end of the spermatangial mother cell; tetrasporangia zonately divided, formed in conceptacles.

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